Dec. 30, 1930. T. O. MORRIS ET AL 1,786,672

MOLDING MACHINE

Filed July 8, 1929

Fig. 1.

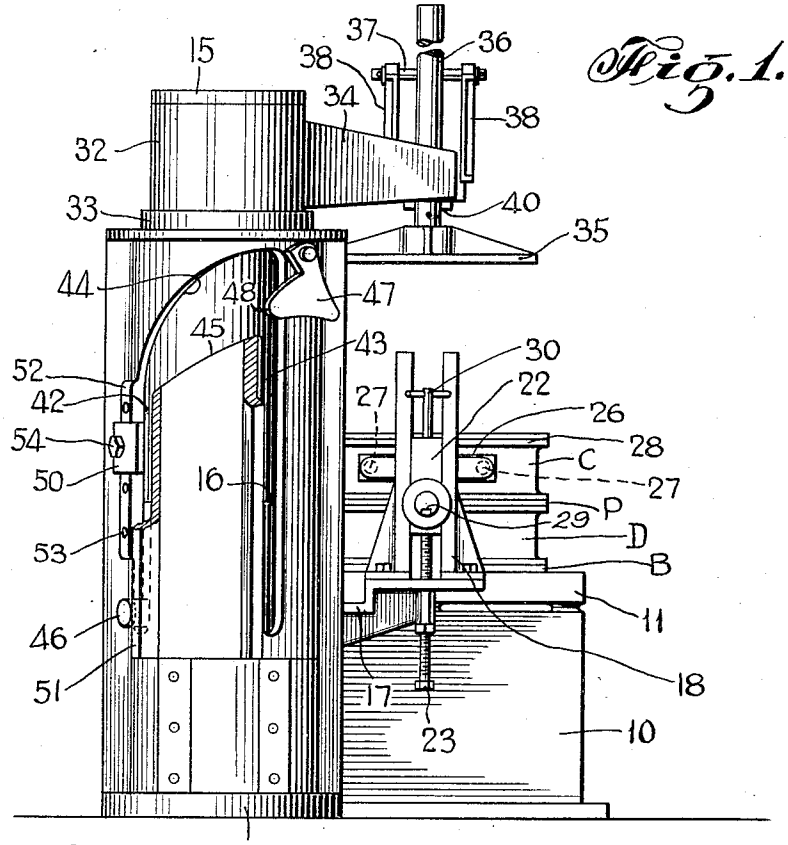
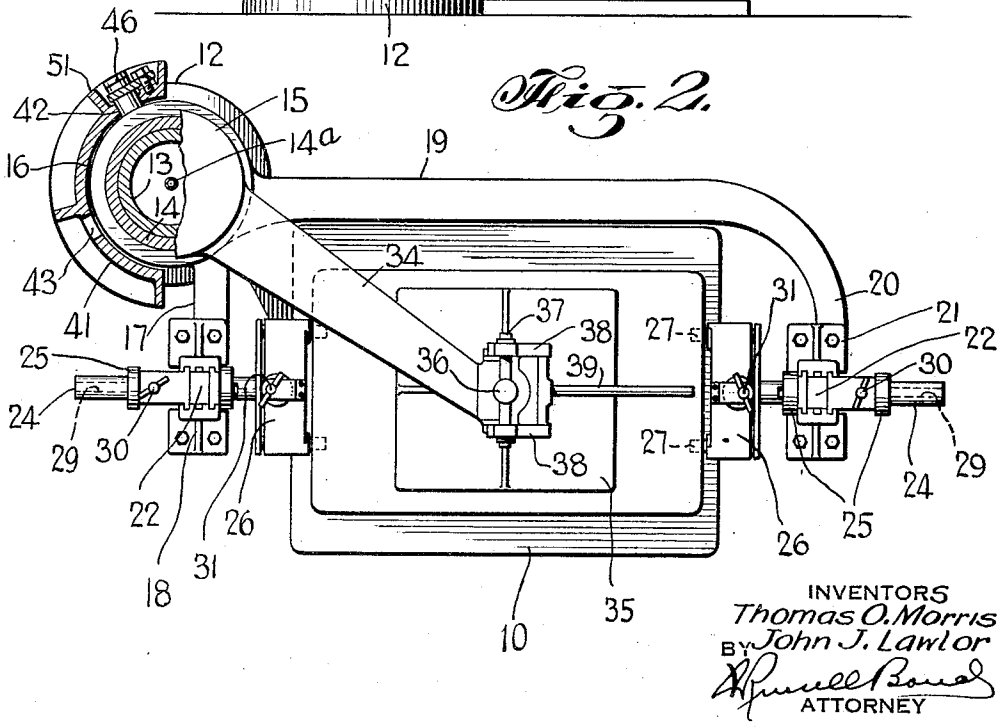


Fig. 2.



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MOLDING MACHINE

Application filed July 8, 1929. Serial No. 376,707.

Our invention relates to improvements in molding machines and particularly to machines of the type disclosed in our copending application Serial No. 346,352, filed March 12, 1929.

The machine described in said application comprises, in general, a table, and a flask carrier which may be moved vertically so that a flask supported thereby will be raised sufficiently to clear the table when it is desired to roll the flask over. The vertical movement of the flask carrier also permits of drawing the pattern. Said machine is also so arranged that when the flask carrier is raised to the limit of its stroke it will turn laterally through an angle of about 90 degrees, so that when lowered again it will deposit its load upon a suitable support outside of the machine. On the next complete vertical reciprocation, the flask carrier will return automatically to its original position adjacent the table. This automatic lateral movement of the flask carrier does away with the necessity for an overhead crane in handling large molds, because the molds or mold sections as they are completed may be deposited by the laterally moving flask carrier upon a conveyor conveniently located adjacent the molding machine. The machine is, therefore, particularly adapted for handling large and heavy flasks. However, when a large number of small molds are to be made it is not necessary to employ automatic means for removing the molds from the machine, nor is it necessary to raise the flask as high, either for the rolling over operation or for drawing the pattern. However, the operator of the machine cannot always gage the proper height to which the mold must be raised and is apt to raise it too far. This means a waste of time which, in working on a production basis, may represent a serious loss.

It is an object of our present invention to provide a stop for limiting the height to which the flask carrier may be raised, said stop being located below the point at which the flask carrier swings laterally.

Another object of our invention is to provide means for adjusting the position of the stop, so as to adapt the machine for patterns and molds of different sizes.

Still another object is to provide a stop which is applicable to the machine when the latter is to be used for high speed work on small molds, such as can be removed manually, the stop being removable so that the machine can also be adapted for use on large molds which must be handled by mechanical power.

A preferred embodiment of our invention will be described in connection with the accompanying drawings and thereafter the novelty and scope of our invention will be pointed out in the claims.

In the drawings;

Figure 1 is a side elevation of our molding machine with certain parts thereof partly broken away; and

Fig. 2 is a plan view of the same with a portion of the machine in section.

In the drawings, we have used the numeral 10 to indicate the base of the molding machine. The base carries a table 11 which may be pneumatically raised and lowered in the usual well known manner. At one side of the table, the base 10 is formed with a cylindrical bracket 12 in which is supported and secured a vertical column or fixed plunger 13. The latter is preferably located adjacent one corner of the table as indicated in Fig. 2. Fitted over the column 13 is a sleeve or cylinder 14 which is adapted to slide on the plunger. A cylinder head 15 closes the upper end of the cylinder and the plunger may be fitted with piston rings (not shown) to provide an airtight seal between the plunger and the cylinder. The upper end of the plunger is closed except for an air pipe 14*a* through which air under pressure is admitted into the space between the top of the column and the cylinder head 15 to raise the cylinder with respect to the column.

Mounted on the cylinder is the hub 16 of a flask carrier. From the hub projects a short arm 17 parallel to the adjacent end of the table 11. The end of this arm provides a support for a pedestal or guide member 18. The hub 16 is also provided with a longer arm

19 which projects at right angles to the shorter arm and passes to the rear of the base 10 and below the level of the table 11 when the parts are in their lowermost position. The outer end of the arm 19 is bent forward, as indicated at 20, and provides a support for a pedestal or guide member 21, similar to the pedestal 18.

Each of the pedestals is provided with ways for a vertically slidably head 22. An adjustable stop, such as a screw 23, serves to limit the normal or low position of each slide head 22. Each slide head provides a bearing for a horizontal shaft 24 which is adjustable axially in the slide head 22. Collars 25 at opposite sides of the head 22 serve to hold the shaft at desired adjustment. Secured to the inner end of each shaft 24, that is, the end toward the table, is a trunnion head 26. Each trunnion head has a pair of pins 27 adapted to engage sockets (not shown) formed in flask 28. Each shaft 24 has a keyway 29 adapted to be engaged by a key in the slide head and a handle 30 serves to raise the key out of engagement with the keyway, so as to permit the shaft to turn in its bearing. The key engages the keyway when the trunnion head is holding the flask in the inverted position. In this position, the pins 27 lie above the shaft 24. When the keys 29 are withdrawn from the keyways 28 the flask may be rolled over to the position shown in Fig. 1, i. e., with the pins 27 lying below the shaft 24.

For different sizes of flasks, the shafts 24 are adjusted lengthwise and are secured in such lengthwise adjustment by means of the collars 25. The pins 27 are spring pressed toward the flask (the springs not being shown) and an eccentric operated by a handle 31 is employed to withdraw each pair of pins from engagement with the flask, whenever desired.

Mounted to turn freely on the upper end of the cylinder 14 is a hub 32 which is fitted between the head 15 and a collar 33 secured to the cylinder. The hub 32 is formed with an arm 34 which at its outer end carries a ram head 35. The ram head has a vertical stem 36 which slides in a bearing in the outer end of the arm 34. This shaft is formed with apertures through which a pin 37 may be inserted. Pivotally mounted at the outer end of the arm 34 are two cam arms 38 which may be swung about their pivot by means of a lever 39. By operating the lever 39 the cam arms may be turned so as to engage the pin 37 and lift the ramhead out of operative position, or to the position shown in Fig. 1. A pin 40 may be inserted in one of the apertures in the shaft 36 under the arm 34 to limit upward movement of the ramhead when desired.

Secured to the bracket 12 is a cylindrically curved cam plate 41 which partly surrounds the cylinder 14. As shown in Fig. 1 the cam plate is formed with two vertical slots 42 and 43 which are connected at the top by an inclined broad slot which widens toward the slot 43. This inclined slot is defined by two spiral walls 44 and 45, respectively, connecting the outer end and inner walls of the vertical slots 42 and 43. Fixed in the hub 16 is a pin 46 which is adapted to engage the grooves in the cam plate 41.

With the parts in the position shown in the drawings it will be evident that when the cylinder 12 is raised and with it the hub 16, the pin 46, while in the slot 42, will keep the hub 16 of the flask carrier from turning; but when the pin enters the inclined slot and engages the spiral wall 44 it will rotate the flask carrier on its axis, thereby swinging the flask laterally away from the machine. Now when the cylinder 14 is permitted to recede by gravity the pin 46 will move down the slot 43. The next time the cylinder 14 is raised the pin 46 will be guided by the slot 43; but as the pin nears the top of its slot it will engage a trigger mechanism and be moved laterally thereby over the spiral wall 45, so that when the cylinder recedes again the pin will be guided by the spiral wall 45 to the vertical slot 42 thereby returning the hub to its original position.

The trigger mechanism above referred to consists of a substantially triangular member 47 which is pivoted near one corner to the cam plate 41 in such position that it will hang by gravity with one nose 48 of the triangle projecting across the slot 43. It will be evident that when the pin 46 moves downward past the trigger it will push the trigger out of its path, but when it moves upward it will strike the nose 48 and will be compelled by the trigger to move laterally toward the slot 42.

The construction so far described is substantially identical with that already disclosed in our copending application above referred to. The novelty of the present invention lies chiefly in a stop means for preventing the hub 16, and hence the cylinder on which it is mounted, from rising more than a predetermined distance. The stop means consists of a stop plate 50 which is adapted to be secured across the cam slot 42. As clearly shown in the drawings, the cam plate is provided with strengthening ribs and one of these ribs 51 lies closely adjacent to one of the walls of the slot 42. The stop plate 50 is of rectangular form with one edge adapted to fit against the rib 51 while the plate is secured to a facing 52 formed on the cam plate at the other side of the slot 42. The facing 52 is provided with a number of threaded holes 53 which are adapted to receive a screw 54 which passes through the plate 50. The plate 50 may thus be attached to the cam plate at any one of a number of positions and will lie in the path of the pin

46, thereby limiting the upward stroke of the flask carrier, as desired. The plate may be removed at will by unscrewing the screw 54, so as to permit a full stroke of the cylinder with resultant lateral movement of the flask carried by the flask carrier.

The operation of the machine is as follows:

We shall assume that the flask is of two part type, comprising a cope C and a drag D. The flask sections are assembled on a table in inverted position with the drag D at the top and the cope C at the bottom and with a pattern plate P fitted between the cope and the drag. The cope is seized between the trunnion pins 27 upon operating the handles 31 to release said pins. The drag is now filled with sand and a mold board is placed on the said. The arm 34 is then swung around, to the position shown in Fig. 2, so that the ram head 35 will overlie the mold and the lever 40 is operated to release the ram head. Thereafter the table is elevated and reciprocated pneumatically in the usual manner, so that the flask will rap against the ram head and jar the sand closely about the pattern. The ram head is now raised by the cams 38 and is swung laterally out of the way. Surplus sand is struck off from the drag and a bottom board B is laid upon the drag over the sand. This board and the flask members are then fastened together by suitable clamps, and compressed air is introduced through the pipe 14*a* to raise the cylinder 14 and thus lift the flask off the table 11, so that the flask may be rolled over. The stop 50 is set to limit the height to which the flask may be raised, said limit being so set that the flask will just clear the table as it is rolled over. After the flask has been rolled over, air is vented from the cylinder 14 to lower the flask upon the table. The parts are then in the position shown in the drawings with the cope C at the top. The cope is now filled with sand which is jarred in the same way as was the drag D. Then after the ram head has been swung out of the way the sections are unclamped, and compressed air is again admitted to the cylinder to raise the flask carrier. However, the cope alone is now raised by the carrier and the drag remains on the table with the pattern board resting on the drag, so that as the carrier is raised the cope will be drawn from the pattern. After the cope and drag are separated and the pattern has been removed, air is again vented from the cylinder 14, permitting the cope to close down upon the drag. The cope is then released from the trunnion pins by operating the handles 31, so that the flask may be removed by hand from the table.

The operation for a large mold is the same except that in such case the stop 50 is removed and the operator controls the height to which the flask carrier is raised by controlling the amount of compressed air admitted into the cylinder. After the pattern has been drawn and the cope and drag sections have been closed together, sufficient air is fed into the cylinder to raise the latter to the upper limit of its stroke, so that the cam surface 44 will coact with the pin 46 to swing the flask clear of the machine, after which the air is released from the cylinder to lower the flask on a support adjacent the machine. The handles 31 are then operated to disengage the flask and upon the next upward and downward stroke of the cylinder the flask carrier will be returned to its original position ready to engage another flask assembled on the table.

Having thus described our invention what we claim as new and desire to secure by Letters Patent is as follows:

1. In a molding machine, a carrier, means for vertically reciprocating the carrier, means operating to swing the carrier laterally when it is raised above a predetermined limit, and a stop for arresting elevation of the carrier below said limit.

2. In a molding machine, a carrier, means for vertically reciprocating the carrier, means operating to swing the carrier laterally when it is raised above a predetermined limit, and a readily removable stop for arresting elevation of the carrier below said limit.

3. In a molding machine, a carrier, means for vertically reciprocating the carrier, means operating to swing the carrier laterally when it is raised above a predetermined limit, and an adjustable stop for arresting elevation of the carrier at a predetermined point below said limit.

4. In a molding machine, a carrier, means for vertically reciprocating the carrier, a cam formed with two angularly spaced vertical grooves, a pin on the carrier adapted to ride in said grooves, means at the top of said grooves for swinging the pin from one groove to the other and vice versa and a stop removably secured adjacent one of the cam grooves for limiting vertical movement of the pin therein.

5. In a molding machine, a carrier, means for vertically reciprocating the carrier, a cam formed with two angularly spaced vertical grooves, a pin on the carrier adapted to ride in said grooves, means at the top of said grooves for swinging the pin from one groove to the other and vice versa, a stop adjacent one of the cam grooves, and means for adjusting the position of the stop to limit vertical movement of the pin in the latter cam groove.

6. In a molding machine, a carrier, means for vertically reciprocating the carrier, a cam formed with two angularly spaced vertical grooves, a pin on the carrier adapted to ride in said grooves, means at the top of said grooves for swinging the pin from one groove

to the other and vice versa, a facing adjacent one of the cam grooves, a plate adapted to span the latter cam groove and limit the travel of said pin, and means for securing the stop plate at any one of a number of predetermined positions on the facing.

7. In a molding machine, a carrier, means for vertically reciprocating the carrier, a cam formed with two angularly spaced vertical grooves, a pin on the carrier adapted to ride in said grooves, means at the top of said grooves for swinging the pin from one groove to the other and vice versa, a stop member adapted to span one of the grooves to limit travel of the pin therein, and means for securing said member at any desired adjustment along said groove.

8. In a molding machine, a table, a vertically movable cylinder, a fixed vertical column fitted within the cylinder and serving as a plunger therefor, means for charging air into and discharging air from the cylinder to effect vertical movement of the cylinder with respect to the plunger, a flask carrier mounted on the cylinder, a cam formed with two angularly spaced vertical grooves, a pin secured to the carrier and adapted to ride in said grooves, means for guiding the pin from the top of one groove to the top of the other, a stop member adapted to span one of the grooves to limit travel of the pin therein, and means for securing the stop member at any desired adjustment along said groove.

9. In a molding machine, a table, a vertically movable cylinder, a fixed vertical column fitted within the cylinder and serving as a plunger therefor, means for charging air into and discharging air from the cylinder to effect vertical movement of the cylinder with respect to the plunger, a flask carrier mounted on the cylinder, a cam formed with two angularly spaced vertical grooves, a pin secured to the carrier and adapted to ride in said grooves, means for guiding the pin from the top of one groove to the top of the other, the cam being formed with a reinforcing rib on one side of one of the cam grooves and a facing bordering the other side of said groove, a rectangular plate adapted to fit upon the facing and against the rib, and means for attaching the plate at one of a number of positions along the facing to limit the travel of the pin in the latter cam groove.

In testimony whereof, we have signed this specification.

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